

# **Operation manual**

### [LOW TEMP. INCUBATOR]

Model: IL-11 / 11A / 21 / 21A

Manual No: 00HAA0001148 (Version: 5.0)

This operation manual describes the important subjects to maintain the product<sub>i</sub>s functions and to use it safely. Especially, be sure to read <Safety Precaution> carefully before you use this equipment. Please keep this manual close to the equipment to use it after reading through it once. Please place it where the new user can find it easily for the safety use when you hand over or lend the equipment to others.





Thank you for purchasing Jeio Techis product.

This operation manual forms a definition of warning marks according to the level of importance and danger in order to use the product safely and correctly and prevent the users from accidents or injuries. Hence, please use the product in accordance with the instructions.

#### **Safety Notice**

#### 1. Caution

This product can cause a big accident in case of improper use of inflammable and combustible solvents in the chamber. Also, operation in the high temperature might cause a mechanical trouble and quality deterioration due to the function and the characteristic of the product.

Safety Pr	ecautions
<b>△</b> DANGER	¡Danger¡ means that the user may have serious damage and even die by improper handling on this unit.
<b>△</b> WARNING	¡Warning¡ means that the user may have serious damage by improper handling on this unit.
<b>△</b> CAUTION	¡Caution¡ means that the user may have minor damage and unit may have physical damage by improper handling on this unit.



Although Jeio Tech thoroughly investigates the possibilities of dangerous situations from using the product, it is not possible to know every single danger. Hence, precautions described in this manual do not cover all the dangerous conditions.

However, you can operate this product safer when you follow the directions in this manual. Please, be sure to pay attention to the directions and be cautious so that a mechanical trouble or an accident would not be occurred.

#### 2. Warning mark of product

The most important thing of the warning is a warning label attached to the product. It is located in front of the door.

Be fully aware of the warning contents during operation.

\* Please change to the new warning label when it is unreadable from wearing out. Please request the new label to us.

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#### 1. For Safe Operation

Be fully aware of the safety since this product does not have a hydrostat.

# **△**DANGER

Do not put inflammable substances like organic solvents.

In case of operation for the high temperature, the samples might ignite and explode from vaporization in the chamber. Explosive materials are acetic acid ester, nitro compound, and etc. Inflammable materials are inorganic peroxides, acetates, organic solvents, and etc.

This equipment does not have a hydrostat.

#### 2. Use and Feature

#### 1) Purpose

- (1) Low temperature incubator is suitable for preservation of culture ground, culture-fluid, and seeds (0°C  $\sim$  4°C), degeneration test of grain and meat (10°C  $\sim$  14°C), cultivation of microbes and plants, COD/BOD measurement (20°C  $\sim$  25°C), suspension of enzyme reaction, preservation of enzyme solution, and desalting of enzyme extract.
- (2) It also can be used for high temperature tests ( $55^{\circ}$ C  $\sim 60^{\circ}$ C) such as environmental variation tests of cultivation, grease, and pigment of high temperature microbes and bacteria.

# **AWARNING**

Do not rebuild the equipment.

Do not use it for other purposes.

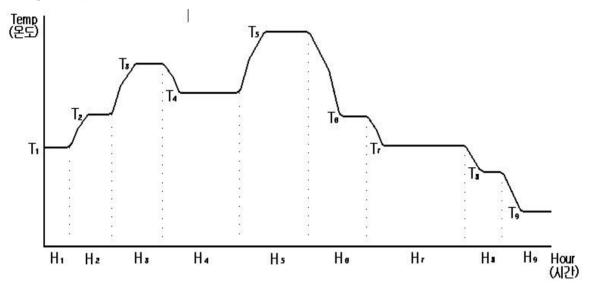
An electric shock or a mechanical trouble might be occurred from rebuilding or using it for other purposes.



#### 2) Characteristics

- (1) This equipment is a multi-purpose low temperature incubator for biotechnology, pharmacy, medical science, chemistry, and biology. It has applied CLS (Custom Logical Safe) ? Control System that Jeio Tech originally developed for the convenience in use and the safety.
- (2) CLS ? Control System means i Control system which has a logical safety device specialized for an individual model. Laboratory must have a thermal safety because there are a lot of inflammable reagents. This system is the highest safety control device (patent applied) and makes the equipment suitable for this kind of environment.
- (3) The unit can be connected to PC using the attached communication port. It is also possible to monitor and set the values using the Lab Tracer (CD included).
- (4) The unit is designed to stop the heater and blower in order to protect the user from heat when the door is opened during the operation.
- (5) The unit has insulation for high temperature in the outside of the inner chamber and inside of the door and also has a chamber silicone door for high temperature. Therefore, insulation is perfect, and the level of losing heat is very low.
- (6) The inner glass door is good for insulation and observation.
- (7) The door attached a magnetic packing has effects on impact relief and double secrecy.
- (8) Circulated fan of a cross type is attached for the distribution of uniform temperature and creates an indirect air-circulation.
- (9) Safety circuit has built-in to protect the equipment from an excess current and an overheating.
- (10) Development of exclusive controller allows the user to control the speed (3 steps) of the inner fan and defrosting (period and time). 9-Step Programmed Control allows the user to set and operate 9 different temperature and time (max: 99 hours 59 minutes). Operation is possible to be repeated from once to 999 rounds.





#### (11) New (Air-Jacket type) - IL-11A, 21A

Air jacket type is accomplished outer heat exchange and inner natural convection independently. Air jacket type performs precise temperature uniformity without air contamination and fits easy dry of the culture fluid.

(No moisture drying by Evaporator and Blower)



#### 3. Setting

(1) Please check the following contents after opening the package.

Main body, Shelf(IL-11/11A: 2EA, IL-21/21A: 3EA), Operation manual, Fuse(IL11: 8A, IL-11A/21:10A, IL-21A: 12A)- 4EA, Communication CD 1EA, Communication cable 1EA, Main power cord 1EA.

(2) This unit is quite heavy. Please carry it with a proper moving tool or 2 people together.

# **ACAUTION**

Be aware of carrying since this unit is heavy.

IL-11: 100kg, IL-11A: 108Kg
IL-21: 135kg, IL-21A: 145Kg

(3) This unit will work correctly on a proper power supply. Please check whether the power supply and ID Plate information are the same. User must use the power supply connected to earth, and power cord must be connected to wall outlet supplying ground point.

### **AWARNING**

Connect the power properly with correct voltage, phase, and capacity.

Improper connection causes a fire or an electric shock.

# **△WARNING**

Use the grounded power supply.

Ungrounded power can give a serious damage to the equipment and the user. For the safety, do not connect a grounding conductor to the gas and water pipes.

(4) Outlet should be located near the unit and shall be easily accessible.

### **AWARNING**

Do not use an ejected socket or a double tap.

Cable damages or a fire can occur by an excess current.



- (5) Please install the unit in the flat place where prevents vibration and shock.
- (6) Please avoid heat sources and direct sun light, and locate the unit where ambient temperature range is 5°C ~ 40°C and relative humidity is lower than 80%.
- (7) Please do not let moisture, organic solvents, dust, and corrosive gas enter into the control box.
- (8) Please donit install the unit in the dangerous place where there are flammable gases, explosive materials, and organic solvents such as acetone and methylene chloride.
- (9) Please secure enough space for installation because the door opens 180; to the left.
- (10) Please do not install the unit near by the machines generating a strong high frequency noise.

#### 4. Notice

- (1) Please do not touch the power cord and electric parts with wet hands.
- (2) Please do not put explosive and flammable chemicals (Alcohol, Benzene, and etc) into the incubator.
- (3) The samples inside of the unit are very hot when the unit operates and for a while after it stops. Please put on safety gloves when you touch samples.
- (4) Please do not place flammable materials near by the unit.
- (5) Please do not pour water on the unit directly when you clean it.
- (6) Please do not put conductive and flammable materials through ventilation or power supply port. It is dangerous and might cause fire and electric shock.
- (7) Circuit and electric components used in this unit are developed by Jeio Tech. Please do not try to repair by yourself. Incorrect combination of electric parts may cause a fire. You must ask an official Jeio Tech dealer or a distributor in your region.



Do not put explosive and flammable materials inside of the chamber.

#### 5. Names

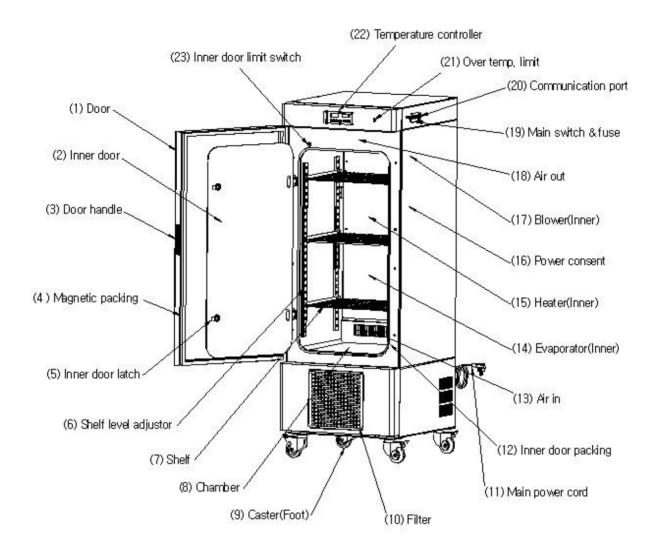


Figure 1. IL-21/21A

#### (1) Door

For using silicone heater, we removed dewdrops on the surface of the door.

#### (2) Inner door

User can observe the inside of the chamber through this transparent and made of reinforced glass inner door.

#### (3) Door handle

It is a door handle for opening.



#### (4) Magnetic packing

It absorbs the impact and protects the samples doubly when door opens and closes.

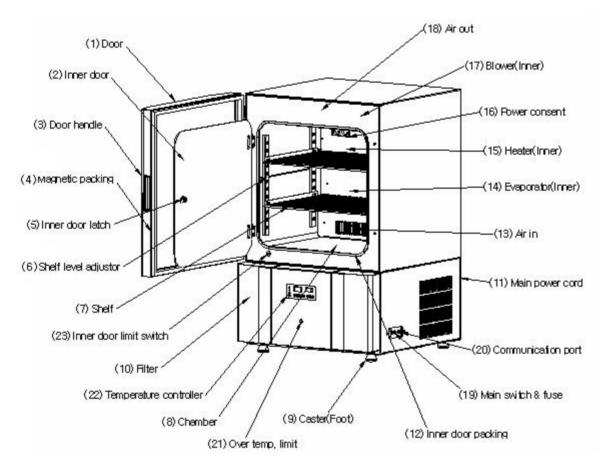


Figure 2. IL-11/11A

#### (5) Inner door latch

It is a handle to fix the inner door. When the latch (IL-11: 1ea, IL-21: 2ea) located on the right side is turned clockwise, the door closes. When it is turned counterclockwise, the door opens.

#### (6) Shelf level adjustor

Shelf level is easily adjustable by the size of samples.

(IL-11/11A: 12 levels, IL-21 / 21A: 26 levels).

#### (7) Shelf

It<sub>i</sub>s made of stainless steel wire. It<sub>i</sub>s easy to clean, and ventilation is good. The surface is electrically polished therefore it has a beautiful view and a good anti-corrosion.

#### (8) Chamber

It is made of stainless steel. There are a blower, a heater, a temp. sensor and a temp. regulator inside of the chamber.

#### (9) Caster (Foot)

It adjusts the level of the unit during installation (IL-11 / 11A).

High-class caster stops movement and rotation when the break function works.

(IL-21 / 21A)

#### (10) Filter

It is a plate that can be easily removed and attached for the ease of condenser is cleaning. It allows the freezer maintain the best condition. (Clean it more than once a week.)

#### (11) Main power cord

It is a cord that supplies the main power.

#### (12) Inner door packing

A silicone rubber seals the air by adhering the inner door and the chamber together.

#### (13) Air inhale hole, (No hole in IL-11A / 21A)

By fan operation, air in the chamber goes through the hole for circulation.

#### (14) Evaporator (inner)

Its role is cooling by circulating and evaporating the iced transfer media.

#### (15) Heater (inner)

The fin-type of heater is installed inside of the unit.

#### (16) Power consent

It allows other equipments can be used for tests in the chamber.

#### (17) Blower (inner)

Circulating fan is used for the distribution of the uniform temperature.

#### (18) Air exhale hole (No hole in IL-11A / 21A)

Air which passed through heater or evaporator is exhausted in chamber.

#### (19) Main switch & fuse

This is a switch for main power. Fuse protects the instrument from an electric shock.



Please check out the correct power supply when you replace a fuse.

Fuse: Main power-8A/250V, 2ea (IL-11)

Main power-10A/250V, 2ea (IL-11A / 21)

Main power-12A/250V, 2ea (IL-21A)

#### (20) Communication port

User can monitor and control this unit by PC. Data print out through PC printer is also available. The unit can be connected to PC<sub>i</sub>s com1 and com2 port through a RS-232C protocol cable.

#### (21) Over temp. limit

If heater temperature rises higher than set temperature, the unit cuts the power of the temperature controller, makes the over temperature LED blink, and warns with a beep sound. To resume the operation, please turn the knob clockwise to set about 15% higher than a set temperature and press a Start/Stop switch ones. Then, check whether the run LED of temperature controller is on.

#### (22) Temperature controller

This has a micro processor (CPU) which has a digital PID auto tuning function. It also has the highest level of safety control system such as a temperature compensational function for temperature sensor and a heating volume controller.

#### (23) Inner door limit switch

It is installed inside of the unit. The Logic IC of this switch puts off the main switch. It cuts off all 2 phase currency in the instrument therefore heater and blower stops for the safety of user. Door LED blinks to indicate the door is opened. If the door is opened more than 5 minutes, then the alarming buzzer rings in order to inform the user that the door is opened for a while. The Door LED and buzzer turns off when the door is closed. Then, the instrument works again.



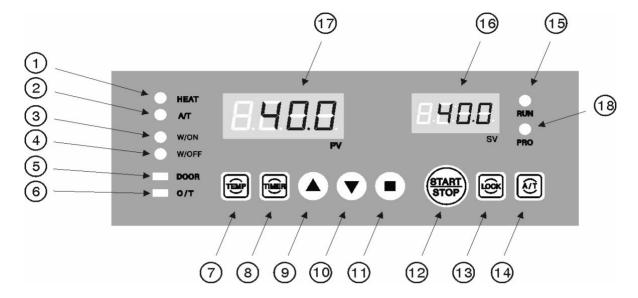
#### 6. Operating Controller

#### 1) Characteristics

- (1) CLS-Control System carries out temperature control of equipment and heating control in the Main CPU where precise PID algorithm is possible. All actions for safety are conducted by a selective functional Logic IC which is installed separately. This is designed to conduct safety performance against any electric and electronic shock on the unit.
- (2) CLS-Control System shuts down all 2 phase power supply to each part immediately and informs user instability by audible and visual device, and then it keeps in safety mode until all instability conditions are removed.
- (3) CLS-Control System has wait on/off timer function for the user<sub>i</sub>s convenience. The function starts or stops the operation after the set time.
- (4) CLS-Control System gives user two choices when the unit is operation is terminated by a power failure and then the power recovers. One is a resume of the unit is operation. Another one is to keep the unit in standstill.
- (5) CLS-Control System is composed that feeble electric current streams down to only 5V, 10mA at a point of contact of a used safety device. There is no damage of a point of contact in use of a long time. So, the durability is very long. After it stops the control of the Thyristor which controls electric current stream of the heater that uses a large electric current when a safety device is operated, it shuts down the power through Magnet Switch<sub>i</sub>s disconnection of a point of contact. It prevents the point of contact from damaging and a noise revelation of a power switch. It enforced with the mentioned objection order above when an operation of equipment starts, and it also prevents the point of contact from damaging and a noise revelation of Magnet Switch.



#### 2) Name and Function



Main CPU of this unit has certified S/W which allows Digital PID-Auto tuning. The unit has a temperature deviation/correction function for the Pt-100 $\Omega$  sensor and the highest safety level of control system.

#### (1) Heater LED

It shows whether heating function is on.

#### (2) Auto Tune LED

It blinks during auto-tuning.

#### (3) Wait On Timer LED

This LED shows when the unit is on a timed ¡on¡ function. The LED blinks when the timer is activated, and it is completely turned on when the timer is on stand by.

#### (4) Wait Off Timer LED

This LED shows when the unit is on a timed ¡off¡ function. The LED blinks when the timer is activated and is completely turned on when the timer is on stand by.

#### (5) Door Open LED

Door LED blinks to indicate the door is opened. If the door is opened more than 5 minutes, then the alarming buzzer rings in order to inform the user that the door is opened for a while. The Door LED and Buzzer turns off when the door is closed. The instrument will work again.

#### (6) Over Temp. LED

If the heater temperature rises higher than set temperature, it cuts the power of the temperature controller, makes the over temperature LED blink, and an alarming beep rings. To resume the operation, please turn the knob about 15% higher than a set temperature and press a Start/Stop switch once. Then, check whether the run led of temperature is on.

#### (7) Temp. Button

This button is for temperature setting.

#### (8) Timer Button

This button is for timer setting.

#### (9) Up Button

This button is for increasing the set value.

#### (10) Down Button

This button is for decreasing the set value.

#### (11) Enter Button

This button is for saving value after changing the set value.

#### (12) Start/Stop Button

This button is for start/stop of unit and for resuming operation after removing some unstable factors when operation is terminated.

#### (13) Lock Button

This is lock the controller buttons.

#### (14) Auto Tune Button

The auto tune begins if you press this button for 1 second.

#### (15) Run LED

This LED indicates Work/Stop state of unit. It turns on when the unit runs and turns off when the unit stops.

#### (16) SV Display



This display is for showing set temperatures and remaining time when the timer function is activated.

#### (17) PV Display

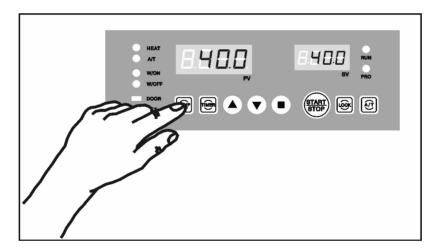
This display is for showing present temperatures.

#### (18) PROGRAM LED

This LED indicates whether the operation is in program or normal status. The LED blinks when the operation is in program status, and it turned off when the operation is in normal status.

#### 3) Temperature Setting Method

(1) Press button. A set temperature value (SV) blinks. This means you can change the set value.



- (2) Press button to change the digit number and then press button when you save the value.
- (3) It goes back to the previous state without saving if you  $don_i t$  touch any button for 10 seconds.
- (4) Press button again when SV display blinks, then following additional functions will be activated.



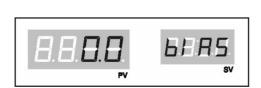
### 4) Additional function of button

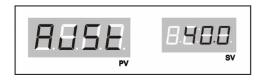












(1) Favorite values can be stored at Sv.1, Sv2, Sv3 for each operation.

Press 2 times and set temp. values by pressing A and V, and conclude the setting by pressing

Set temperature is saved on memory and set temperature varies Sv1, Sv 2, Sv 3 are applied the same.

Press button repeatedly then Sv1, Sv2, Sv3 are shown and temperature unit set mode shown by pressing 5 times repeatedly.

(2) This is a function vary the unit of temperature value.

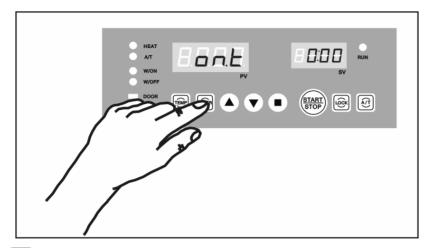
(3) Next mode is shown by pressing 6 times.

This compensates the temp. value errors.

Requested values are put on PV display. Move to the next mode by pressing and buttons.

PV is put on the SV display and can be set as exactly as shown on thermometer. Set the value by pressing and , and conclude the setting by pressing

#### 5) Setting Timer



(1) Button 1 time at early stage.

(On Timer / Off Timer) can be displayed on PV display and Time can be displayed on SV display. Input necessary time by buttoning 

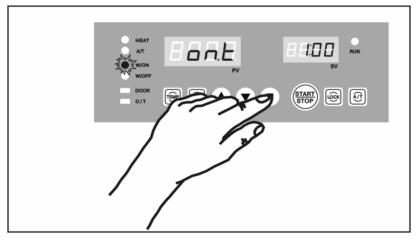
and 

and 

and 

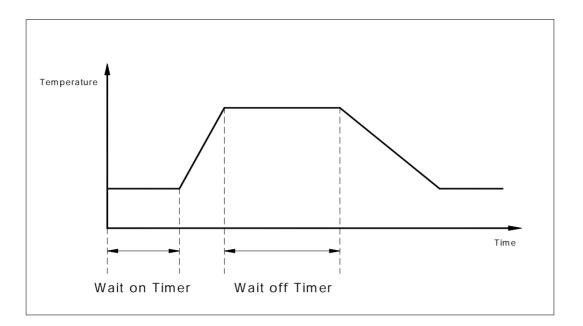
and store by buttoning

(2) W/ON LED is on with Beep sound after setting



- (3) Press button one more time. You can set the wait off timer. Set the time by pressing button and save and finish by pressing button.
- (4) After the setting is done, a beep sound and W/OFF LED inform that setting has been completed.
- (5) The function of Timer is shown below.





#### ■ Wait On Timer

- The unit begins to work after the time programmed on Wait On Timer passes.
- The maximum of adjustable value is 99 hrs 59 min, and the minimum is 1min.

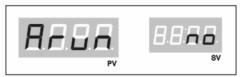
#### ■ Wait Off Timer

- The unit stops after the time programmed on Wait Off Timer passes since SV and PV meet.
- Combination of Wait On Timer & Wait Off Timer.
  - The unit works as a picture above.
- (6) Timer set deactivation

Press button in order to deactivate timer function (Both on/off timer). In order to cancel only one of the timers, set the value of the timer to 0.

6) Additional Function of Button (Auto Run)

When you press button three times from the initial state, following function operates.



(1) This is to select the machine mode in case of a power failure. This function operates the



equipment automatically after a power recovery in case of a block out during operation or a power cut by mistakes. When the user sets to ¡Yes¡, the equipment operates the moment the power is recovered.

7) Additional Function of Button (Fan speed control)

When you press button four times from the initial state, following function operates.



- (1) This function is to control the speed of inner circulating fan. It is recommended to be set as a third stage since slow speed does not contribute the temperature distribution. (0 to 3 stage is possible.) 3 stage recommended.
- 8) Additional Function of Button (Programmed Control)
  - 9-Step Programmed Control allows the user to set and operate 9 different temperature and time (max: 99 hours 59 minutes). Operation is possible to be repeated from once to 200 rounds. When you press button five times from the initial state, following function operates.



(1) It indicates the entire repetitive number of program. Loop 100 means that it will operate 100 times. Set the number by pressing button and save by pressing button.

The next function operates when you input more than 1. Input 0 when you do not want to operate this program.



(2) SEg.L is a segment logic that divides the section is boundary. When you input 3 here, third program is repeated from second repetition. Set the section by pressing button and save by pressing button.





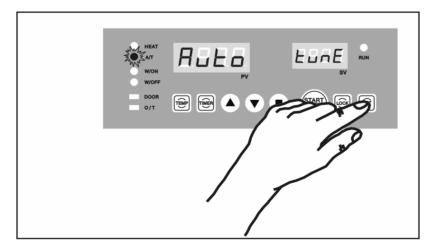
(3) This function is to set the maintaining time of the first program. When you input 10:10, operation maintains for 10 hours and 10 minutes (max: 99 hours 59 minutes). Set the time by pressing ▲ ▼ button and save by pressing ■ button.



- (4) This function is to set the maintaining temperature of the first program (4  $^{\circ}$ C  $\sim$  60  $^{\circ}$ C). Set the temperature by pressing  $\bigcirc$  button and save by pressing  $\bigcirc$  button.
- (5) You can set the 9 step program by operating (3) ~ (4). That is, you can set time 2 and temperature 2 at program 2 and set the time 3 and temperature 3 at program3 and so on (till program 9). You can input 0 to cancel the setting.

#### 9) Operating Auto Tune

Auto Tuning is performed for more exact and faster temp. controlling. PID values are stored automatically after tuning.



- (1) Set Temp.
- (2) A/T LED is on with Auto Tune signal on displays by buttoning for 1 second.
- (3) Auto Tune works with being on of RUN LED and flashing A/T LED by buttoning (START)
  - uto Tuno ono
- (4) Auto Tune time can be changed by working condition. LED is off by finishing Auto Tune and



control Auto Tune temp continually.

Ref) While operating, if buttoning for 1 second, the machine auto tunes by itself with display shows Auto Tune on it.

#### 10) Lock Function

This is to lock controller buttons.

- (1) Press button for a while (3seconds), then Lock function is set with Beep sound and the unit wouldnit corresponding any more key pressing.
- (2) In order to deactivate this function please Press button for 3 seconds again.
- (3) This protects improper pressing of the controller buttons while operation.



#### 7. Maintenance



Pull out a power plug from the outlet before the cleaning and inspection.

Turn off the main power switch and pull out the power plug before the cleaning and inspection. An electronic shock or damages on the unit might occur.

- (1) When you clean the unit, pull out the power cord from the outlet and wipe it with a soft and dry cloth. Wipe the dirt with a cloth containing the solvents that have a low boiling point (methanol and ethanol).
- (2) Do not use acid solvents, benzene, sharp materials, soapy water, washing solvents, and hot water. They can cause the damage or discoloration of the unit. Parts with rubber and plastic can be changed, degenerated, or discolored. Wipe the unit with a dry cloth after using a natural detergent. Then, dry it completely.

# **ACAUTION**

Use proper methods and materials for cleaning and inspection.

Do not pour the water directly or use polishing powder, kerosene, acid on the unit. An electronic shock or damages on the unit might occur.

- (3) Use appropriate safety gloves for harmful chemicals and a safety mask for harmful gasses in the event of cleaning accidental chemical spills from the unit.
- (4) Do not pour the water directly on the equipment (especially control panel). Short-circuit can be occurred.
- (5) If the user tries to clean this unit with other method not mentioned on this manual, please contact us in order not to damage the unit.
- (6) Only authorized technician can treat the electronic parts inside of the equipment.
- (7) Use only the original parts for replacing.



Do not disassemble the equipment.

An electronic shock or an injury might occur when you disassemble since there are parts where high voltage flows and high temperature locates inside of the equipment.



- (8) The mechanical trouble that is deviated from normal limit cannot be repaired.
- (9) When you do not use the equipment for a long period of time, keep it in the dry place after pulling out the plug and packing.

### 8. Dealing with abnormal Condition

- 1) If the equipment does not operate
  - (1) Check out the power supply.
  - (2) Check out the fuse.
  - (3) Check out whether the Run LED on display is off. Please press the Start / Stop button if it is off.
  - (4) Please check whether the power is out.

#### 2) Malfunction check list (electricity)

Symptom	Check	What to Do
	A short circuit	Stop the operation and contact the
shuts down although		dealer
you turn it on		
Display panel does not	The power plug is not	Turn off the power and insert the
work although power	inserted completely	plug on the outlet
switch is on	The power switch is broken	Open the control panel and check
	Temperature controller is	the main board, switch, and display
	broken	board
When temp. does not	Check whether the Run LED	When the Run LED is off, press the
increase	is on	start/stop button
When temp. is not	Check the ¡Err.S¡ on PV	Open the control panel and check
controlled	display	the connection between the main
		board and the temp. sensor
When the unit does not	① Check if O/T LED is red,	① After turn the over temp. limit
operate due to over	② Check if a beep	knob clockwise with (-) screwdriver
temp.	continuously rings	to the point that is at least 15%
		higher than the PV, press the
		start/stop button once. Then, red
		light on O/T LED and a beep sound
		will be turned off.
		② When you press start/stop
		button once, lights on Run LED and
		Heater LED will be turned on and
		the unit will re-operate.



When the operation by	① Check if Door LED is red,	① Check if the inner door is open
door limit switch stops	② Check if a beep	② Check if the light on Run LED is
	continuously rings	turned on after pressing the
		start/stop button
When the entire control	Strong noise affects the user	Move the equipment that causes
is stopped without the	from the power line	the problem or relocate the
situation or the button	Check if high frequency	incubator
control stated above	welding machine, sewing	
	machine, or large SCR	
	controller is installed near	
	the unit	

### 3) Malfunction check list (refrigeration)

When the	wind	of	Check	if	there	is	an	- Check if the power is connected
freezing	circulat	ion	obstruct	ion	in the a	air in	hale	to the proper voltage
motor is wea	ık.		hole					- Repair or replace
Or, when ten	np. does	not	There is	dus	t in the	filter		Clean the filter and the condenser
decrease.								fin
			The free	ezer	is inferio	or		Request for the service

If you can't find the solution in this check list, please call a repair service.

### 9. Warranty

#### 1) General

The warranty period is 1 year since you purchase the product under the condition of a normal use. You can get a fast and accurate repair when you request it with the following items.

- \* Purchased date
- \* Serial Number(on the name plate)
- \* Defective part and condition
- \* Circumstance of equipment use

#### 2) Exception

You need to pay for the service in case of the following situations.

- \* Useris fault in use
- \* Useris fault in handling and custody
- \* Unreasonable change of use, rebuilding, and repair
- \* Defects by a natural disaster such as a fire, a flood, and an abnormal voltage
- \* Defects from not following the directions of the manual

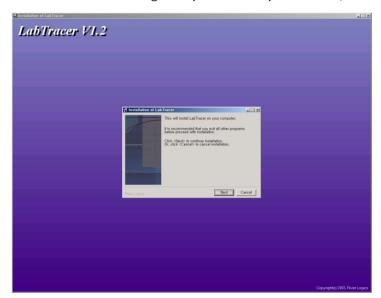


### 10. Specifications

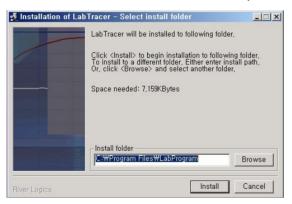
Temperature 5°C to 40°C   Maximum relative humidity 80%   Altitude up to 2,000m	254									
Temperature 5°C to 40°C   Maximum relative humidity 80%   Altitude up to 2,000m										
Permissible environmental condition  Range 0 ° ~ 60 ° +4 ° ~ 60 ° +4 ° ~ 60 ° C  Accuracy i 0.1 ° at 20 ° C  Uniformity i 0.5 ° at 20 ° C  Controller Digital PID auto tuning  Timer Wait on time, Wait off time(Max. 99hr 59min, Min. 1 on the stainless steel, 0.8t  Sensor type Pt 100 Ω  Internal Stainless steel, 0.8t  External Steel, 0.8t, 1.0t, powder coating  Shelves Stainless steel wire, electro polished (standard/max) 2/12 EA 3/26 EA 2/12 EA 3/2 EA 3/26 EA 2/12 EA 3/2 EA 1000 650 Insulation Nonflammable polystyrene foam & glass wool, 2 Inner door Tempered safety glass, 5t	min)									
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	min)									
Temperature  Uniformity i 0.5° at 20° Controller Digital PID auto tuning  Timer Wait on time, Wait off time(Max. 99hr 59min, Min. 1 Sensor type Pt 100 Ω  Internal Stainless steel, 0.8t  External Steel, 0.8t, 1.0t, powder coating Shelves Stainless steel wire, electro polished (standard/max) 2/12 EA 3/26 EA 2/12 EA 3/2  Material  Heater (W) 700 450i 2EA 1000 650 Insulation Nonflammable polystyrene foam & glass wool, 2 Inner door Tempered safety glass, 5t	min)									
Temperature  Controller  Digital PID auto tuning  Timer  Wait on time, Wait off time(Max. 99hr 59min, Min. 1  Sensor type  Pt 100 Ω  Internal  Stainless steel, 0.8t  External  Steel, 0.8t, 1.0t, powder coating  Shelves  Stainless steel wire, electro polished  (standard/max)  2/12 EA  3/26 EA  2/12 EA  3/3  Material  Heater (W)  700  450; 2EA  1000  650  Insulation  Nonflammable polystyrene foam & glass wool, 2  Inner door  Tempered safety glass, 5t	min)									
ControllerDigital PID auto tuningTimerWait on time, Wait off time(Max. 99hr 59min, Min. 1Sensor typePt 100 ΩInternalStainless steel, 0.8tExternalSteel, 0.8t, 1.0t, powder coatingShelvesStainless steel wire, electro polished(standard/max)2/12 EA3/26 EA2/12 EA3/2MaterialHeater (W)700450i 2EA1000650InsulationNonflammable polystyrene foam & glass wool, 2Inner doorTempered safety glass, 5t	min)									
Sensor typePt 100 ΩInternalStainless steel, 0.8tExternalSteel, 0.8t, 1.0t, powder coatingShelvesStainless steel wire, electro polished(standard/max)2/12 EA3/26 EA2/12 EA3/2MaterialHeater (W)700450i 2EA1000650InsulationNonflammable polystyrene foam & glass wool, 2Inner doorTempered safety glass, 5t	min)									
Internal Stainless steel, 0.8t  External Steel, 0.8t, 1.0t, powder coating  Shelves Stainless steel wire, electro polished  (standard/max) 2/12 EA 3/26 EA 2/12 EA 3/2  Heater (W) 700 450i 2EA 1000 650  Insulation Nonflammable polystyrene foam & glass wool, 2  Inner door Tempered safety glass, 5t	Wait on time, Wait off time(Max. 99hr 59min, Min. 1min)									
External Steel, 0.8t, 1.0t, powder coating  Shelves Stainless steel wire, electro polished  (standard/max) 2/12 EA 3/26 EA 2/12 EA 3/2  Heater (W) 700 450; 2EA 1000 650  Insulation Nonflammable polystyrene foam & glass wool, 2  Inner door Tempered safety glass, 5t										
Shelves Stainless steel wire, electro polished (standard/max) 2/12 EA 3/26 EA 2/12 EA 3/2  Heater (W) 700 450; 2EA 1000 650  Insulation Nonflammable polystyrene foam & glass wool, 2  Inner door Tempered safety glass, 5t	Stainless steel, 0.8t									
(standard/max) 2/12 EA 3/26 EA 2/12 EA 3/26 EA Heater (W) 700 450; 2EA 1000 650 Insulation Nonflammable polystyrene foam & glass wool, 2 Inner door Tempered safety glass, 5t	Steel, 0.8t, 1.0t, powder coating									
Material Heater (W) 700 450; 2EA 1000 650 Insulation Nonflammable polystyrene foam & glass wool, 2 Inner door Tempered safety glass, 5t										
Insulation Nonflammable polystyrene foam & glass wool, 2 Inner door Tempered safety glass, 5t	3/26 EA									
Inner door Tempered safety glass, 5t	650 <sub>i</sub> 2EA									
	Nonflammable polystyrene foam & glass wool, 25t									
Over temp. limit Hydraulic over temp. limit	Tempered safety glass, 5t									
	Hydraulic over temp. limit									
Refrigerator         1/8Hp(HBP)         1/6Hp(HBP)         1/4Hp(HBP)         1/3H	p(HBP)									
Safety device CLS(Custom Logical Safe) - control system	CLS(Custom Logical Safe) - control system									
Print interface RS-232										
Internal 500 940 500	540 <sub>i</sub> 940									
(W <sub>i</sub> D <sub>i</sub> H)   External   · · ·   · · ·   · · · ·	670 <sub>i</sub> 760 <sub>i</sub> 1680									
Inner door 5t <sub>i</sub> 615 <sub>i</sub> 530 5t <sub>i</sub> 515 <sub>i</sub> 965 5t <sub>i</sub> 615 <sub>i</sub> 530 5t <sub>i</sub> 5	•									
AC 230 V, 4.7A 6.7A 7.8A 8	•									
Electric 50 Hz	680 15 <sub>i</sub> 970									
requirements AC 120 V, 60 Hz 8.3A 10.6A -	680									
Weight(net) (kg) 100 135 108	680 15 <sub>i</sub> 970									

#### 11. Install Lab Tracer

(1) Insert Installation CD and the software starts installation automatically. (In case of no automatic running, run ¡ SETUP.exe¡ file in CD.)



(2) Click ¡Next¡ button to choose destination of installation. (Default folder recommended)



- (3) Click i Installi to start installation.
- (4) Lab Tracer icon will be created on desktop after installation successfully.
- (5) To start Lab Tracer, double click the icon.

Standard Recommend

Beyond Microsoft Windows 98 Microsoft Windows 2000, XP

Caution: If Windows 95 or 98 OS system is installed, time delay can arise between

measuring time.

#### 12. How to use Lab Tracer.

(1) Connection for communication

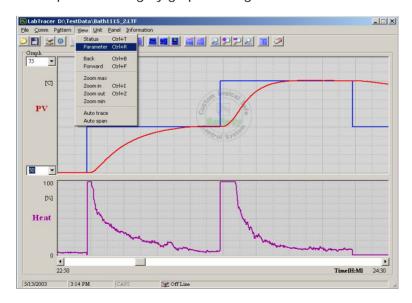
Click Comm  $\rightarrow$  Connect and your PC and equipment start connection of communication. (In case of no connection, click Comm  $\rightarrow$  Port and try to other ports.)



¡On Line¡ displays on the bottom of the software, once communication is connected successfully. The window consists of 2 separate windows. Window on the top displays Temperature set point and actual temperature and window on the bottom displays output value of heating in graph mode.

#### (2) View

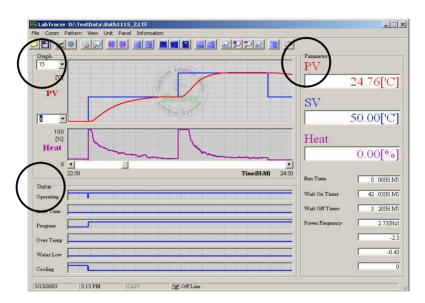
① If you click View → Parameter, window displays actual temperature, temperature set point and output of heating by graph and figures.





② If you click View → Status, additional separate window appears below showing actual temperature and set point window. Operating, Auto Tune, Program, Over Temp., Level, and etc display on this window.

The following picture is a monitoring window after choosing Status and Parameter in View menu.



User can monitor operating process through three divided interfaces. (Graph, Parameter, Status)

#### Graph displays;

Actual temperature (Red line) and set point (Blue line) on the top of separate interfaces.

- Status says that;
  - Operating represents the unit is Running.
     If blue line is Hi, the unit is On(operating). If blue line is Low, the unit is Off.
  - **Auto Tune** displays whether the unit performs Auto Tuning or not.
  - **Program** displays whether the unit is in programmable mode or not.
  - Over Temp. displays over heating condition of a unit.
  - Water Low displays whether Water Level works or not.
     In case water is at the low level, blue line is Hi position and low position under normal condition.
  - Cooling displays whether compressor works or not.



- 3 Parameter interface has following values;
  - **PV** is actual temperature.
  - **SV** is temperature set point.
  - Fig. Heat is output value of heating element.
  - Run Time says operating time after you press start button.
  - Wait On Timer, Wait Off Timer displays remained time from setting time.
  - Power Frequency displays frequency of current power.
- (3) Menu icon



a File Open (Ctrl + O)

To open saved graph.

b File Save (Ctrl + S)

To save proceeding graph.

© Connect (Ctrl + C)

To connect unit and PC via RS-232 communication.

d Disconnect (Ctrl + D)

To disconnect RS-232 communication.

e Exit (Ctrl + X)

To terminate Lab Tracer.

f Print (Ctrl + P)

To print saver graph or proceeding graph. (refer to p30)

Preview

To preview before printing.

(h)(i) Scroll icon

To scroll graph.

(j)(k) Auto Trace On/Off

If you want to fix and monitor the last point of graph on the center of windows, Click Auto Trace.

① Mauto Span On/Off

Set Y axis(temperature range) of graph manually or automatically. You can put values of range if you choose manual.



- n To display Status interface. (Ctrl + T)
- To display Parameter interface. (Ctrl + R)
- Panel View

When you click Panel View, the same appearance of display panel of unit pops up and you can control the unit by the pop-up window.

Set Pattern of Program Run.
 Set Pattern of Program Run and makes unit in a programmable operation.
 Maximum number of pattern is 100 during 99hour.

# **ACAUTION**

#### - Program function can be controlled only by PC.

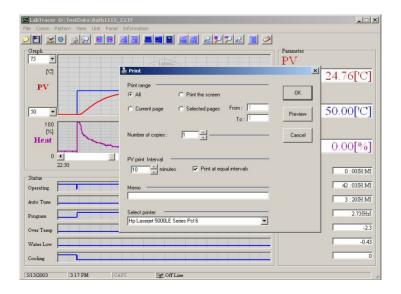
Program Run.

Program Run must be set in the main unit.

- (\$) ~ (V) Zoom In/Out.
- W ~ X To convert temperature scale from °C to °F or vice versa.

(Note: Temperature scale of main body is not changed even though you convert temperature scale from Lab Tracer. To changer temperature scale of main body, you must change setting value of controller in main body.)

- y To erase graph.
- (4) Print



#### 1) Print range

- All : Print a total page.
- Print the screen: Print the current screen. (In case Graph, Status, Parameter Frame on the window, they are printed. If not, they are not printed.
- Current page: Print a page of the currently main screen.
- Selected pages : Print selected page(s).

#### 2 Number of copies

- Maximum number of copies are 100 by scrolling up and down button.

#### 3 PV print interval

- If you tick this option, PV and SV are printed in text mode.

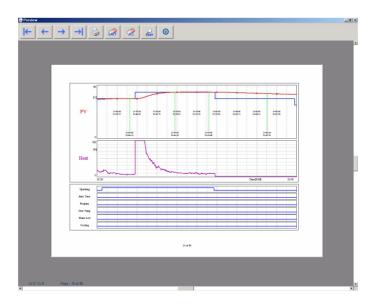
#### 4 Memo

- Can write brief memo on print. Maximum to 60characters.

#### Select Print

- Can choose a printer.

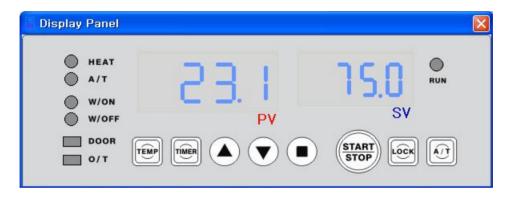
#### (5) Preview and print



In case Print at equal intervals is ticked, PV and SV is printed in a regular interval(see above)

when you see preview and printing. If user wants to check a certain point, move curser to the point and click. Green line with PV and SV will be printed on the copies. (see above)

- 1 Last Point Delete
- **₩**
- Delete last set point.
- ② All Point Delete
- Delete all set points.
- 3 Zoon in / out
  - Zoon in or Zoon out.
- (6) Display



Performance of Display window is same as that of main display panel.

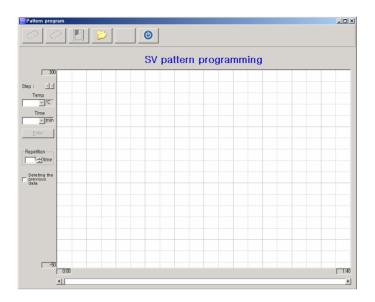
If communication via RS-232 between PC and main body is successful, user can control main body with your PC at a distance.

#### (7) Pattern Program



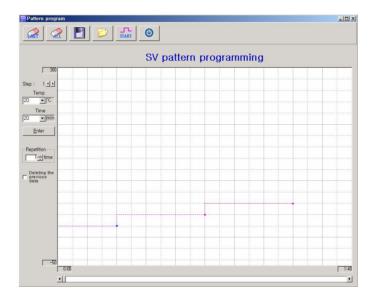
Pic 1. Main Lab Tracer

The following window will be open in case click PRG icon or **Pattern** -> **Pattern settings in** menu.



Pic 2. Pattern Program

In case you move mouse and click a certain point like pic 3., temperature set point and time, step number display on left side of window.



Pic 3. SV Pattern after clicking a certain point of window.

If you want to edit the selected point, Drag & Drop the selected step (blue color). It is very convenient to use short-keys when you want to change temperature and time. Because temperature can be adjusted 1 degree unit and time adjusted one minute unit.

#### 1 Short-key

↑: Increase temperature by 1 degree.

- ↓ : Decrease temperature by 1 degree.
- ←: Decrease time by 1 minute.
- $\rightarrow$ : Increase time by 1 minute.
- Alt  $+ \uparrow$ : Move an edit point to the right (the following step)
- Alt +  $\downarrow$ : Move an edit point to the left (a previous step)
- Alt  $+ \leftarrow$ : Move an edit point to the left (a previous step)
- Alt  $+ \rightarrow$ : Move an editing point to the right (the following step)
- 2 Last step delete



- Delete last set step.
- 3 All step delete



- Delete all set steps.
- (4) Pattern save



- Save programmed pattern.
- File extension is PIT.
- Choose a folder and write file name. Then, click save button.
- ⑤ Pattern open

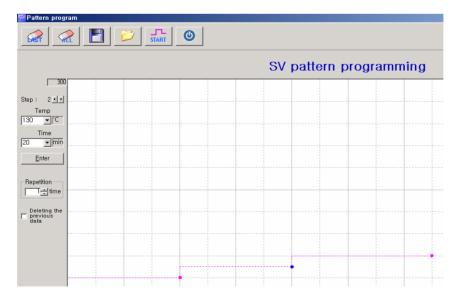


- Choose a pattern file and click open.
- Start



- Click the START icon to operate unit after Pattern is set.

Note: i) If the main body is under abnormal condition such as Door Open, Over Temp. and etc, the main unit will not work.



Pic 4. Step information and control option.



- If you put and set number of pattern repetition, the main body will work as programmed.
- If you tick **¡Deleting the previous data¡** and press start icon, previous data will be erased. Please, be cautious.

#### Caution

- Maximum operating time is up 99 hours.
- If you program total working time over 99 hours, the unit does not perform in Program Mode. Especially be cautious when you program pattern repetition.
- Please, be aware of specification and program time and temperature.
- If you program pattern over equipment performance, the units can not work properly.